A REAR PROJECTION TELEVISION RECEIVER OPTICAL SCREEN MOUNTING SYSTEM

The subject invention relates to rear projection television receivers, and more particularly to a system for mounting an optical screen in the rear projection television receiver.

Fig. 1 shows a schematic block diagram of a typical rear projection television receiver. Television signals are received by antenna 10 and applied to television circuits 12. While antenna 10 is shown, it should be understood that the television signals may originate from various other sources, for example, cable television, a satellite television receiver, a video cassette recorder/player, or a DVD player. Television circuits 12 process the received television signals and supply display video signals for display. To that end, panel driver circuits 14 receive the display signals and apply controlling signals to a display panel array 16. A power supply 18 supplies operating power to the television circuits 12, the panel driver circuits 14, and to a light source 20 for illuminating the display panel array 16. The video signals from the display driver circuits 14 cause the display panel array 16 to modulate the light beams emanating from the light source 20. The modulated light beams are then focused by projection lenses 22 onto a Fresnel lens 24, which collimates the projected light beams into parallel lines to an optical display screen in the form of a display lens array 26. The display lens array 26 then spreads the collimated light rays into the viewing area.

A problem that arises with the display lens array is that any bowing of the display lens array results in significant inward pin-cushioning of the displayed image. In rear projection television receivers in which the projecting light beams are formed by cathode ray tubes instead of light impinging a display panel array, this pin-cushioning may be corrected electronically. However, in display panel array-type projection television receivers, in which the display panel array is in the form of a matrix display, e.g., liquid crystal or plasma display (LCD) or deformable mirror display (DMD) devices, such a correction is not generally provided. While technologies exist to provide this functionality, it can only be done at a high incremental cost.

Prior art rear projection television receivers having matrix display panels cope with this problem by increasing the thickness of the display lens array to achieve additional stiffness thereby reducing the tendency of curvature in the display lens array, which in turn, reduces the non-linearity. However, this increased thickness increases the weight of the display lens array as well as the cost of manufacturing the same. Further, this increased thickness may adversely affect the optical performance. As such, thin screens have been predominantly chosen for increased optical performance.

It is an object of the invention to provide a mounting system for the optical display screen of a rear projection television receiver which compensates for any bowing in the optical display screen thereby enabling the use of a thin optical display screen.

This object is achieved in a mounting system for use in mounting an optical display screen in a rear projection television receiver, said mounting system comprising mounting means formed on a housing of said rear projection television receiver, and a plurality of mounting bracket assemblies, each of said mounting bracket assemblies comprising means for connecting said mounting bracket assembly to said optical display screen; means for attaching said mounting bracket assembly to said mounting means; and means for elastically coupling said connecting means to said attaching means, wherein said elastic coupling means applies a stretching force from said attaching means to said optical display screen via said connecting means thereby eliminating any bowing in said optical screen.

By stretching the mounting bracket to engage with the mounting means on the housing of the rear projection television receiver, tension is provided to the optical display screen, the amount of which can be designed to suit the application, i.e., for different screen sizes. Because of the use of high-bond adhesives to bond the mounting bracket assemblies to the optical display screen, no holes are required in the optical display screen. This leads to a higher yield in the optical display screens in that adding holes to the optical display screens increases the risk of damage to the optical display screens, and the added holes may not be sufficiently robust to handle the stresses required to straighten the optical display screen.

The mounting bracket assembly of the subject invention may be used to mount optical display screens of any thickness, and is not restricted to only thin optical display screens, in that the mounting bracket assembly provides a measure of shock protection to the optical display screens, i.e., holding them secure but not rigidly.

With the above and additional objects and advantages in mind as will hereinafter appear, the invention will be described with reference to the accompanying drawings, in which:

Fig. 1 shows a block schematic diagram of a rear projection television receiver;

Fig. 2 shows a plan view of a first embodiment of a mounting bracket assembly in accordance with the invention;

Fig. 3 shows a side view of the mounting bracket assembly of Fig. 2;

Fig. 4 shows a plurality of mounting bracket assemblies of Fig. 2 formed together;

Fig. 5 shows an embodiment of the mounting means on the housing of the projection television receiver;

Fig. 6 shows a second embodiment of the mounting bracket assembly of the subject invention; and

Fig. 7 shows a third embodiment of the mounting bracket assembly of the subject invention, which is a modification of the mounting bracket assembly shown in Fig. 5.

Figs. 2 and 3 show a first embodiment of a mounting bracket assembly of the subject invention. The mounting bracket assembly 100 includes a display screen connecting section 102 for connecting the mounting bracket to an optical display screen of a rear projection television receiver. The connecting section 102 includes a U-shaped channel 104 into which an edge of the optical display screen may be inserted. The connecting section 102 is then affixed to the optical display screen by way of a high-bond adhesive, such as VHB made by 3M Corporation. The mounting bracket assembly 100 further includes a housing attaching section 106 which includes a through-hole 108 for engaging mounting means in the housing of the television receiver. The connecting section 102 and the attaching section 106 are interconnected by a coupling section 110.

The coupling section 110 is capable of exerting a tension between the connecting section 102 and the attaching section 106 when the coupling section is stretched. To that end, at least the coupling section of the mounting bracket assembly 100 may be formed of an elastic material, such as rubber. To ease in manufacture, the entire mounting bracket assembly 100 may be injection molded out of a rubber-like substance, in which the dimensioning of the connecting and attaching sections 102 and 106 are such that added stiffness is achieved over that of the coupling section 110.

As shown in Fig. 4, multiples ones of the mounting bracket assemblies 100 may be formed together to form an elongated mounting bracket 112.

Fig. 5 shows an example of means for mounting the mounting bracket assemblies 100 to the housing of a rear projection television receiver. In particular, a portion of the rear projection television receiver housing 120 is shown. The housing 120 includes a substantially rectangular opening 122 over which the optical display screen is mounted. At appropriate positions around the periphery of opening 122, bosses 124 are formed on the housing 120. These bosses 124 are sized to engage the through-holes 108 in the mounting bracket assembly 100. When the through-holes 108 engage the bosses 124, the mounting bracket assembly 100 may be retained in position by use of screws in the bosses 124. Instead of the bosses 124, pins may be positioned accordingly for engaging the through-holes 108 in the mounting bracket assemblies 100.

The bosses 124 (or pins) on opposing sides of the opening 122 are positioned such that when the through-holes 108 in the mounting bracket assemblies 100 engage the bosses 124 on opposing sides of the opening 122, the coupling section 110 exerts a tension on the optical display screen affixed to the connecting section 102 of the mounting bracket assembly 100.

Fig. 6 shows an alternate embodiment of the mounting bracket assembly 100', in which the connecting section 102' is formed by a pad 130 which may be cemented to a surface of the optical display screen 132. The Attaching section 106' is then formed by a U-shaped channel 134 for engaging a mounting rail 136. Again, the coupling section 110 of the mounting bracket assembly 100' elastically connects the connecting section 102' to the attaching section 106'. The mounting rail 136 has a first, tongue portion 138 for engaging the channel 134 in the attaching section 106', a second

portion 140 for supporting the optical display screen 132, and a third portion 142 having a through-hole 144 for engaging the bosses 124 (or pins) in the housing 120. In use, the pads 130 are cemented to the surface of the optical display screen 132, and the mounting rail 136 is mounted to the housing 120 using the bosses 124 for engaging the through-holes 144 in the mounting rail 136. The coupling sections mounting bracket assemblies 100' are then stretched such that the U-shaped channels 134 in the attaching sections 106' engage with the first portion 138 of the mounting rail 136. The first portion 138 may be affixed to the attaching sections 106' of the mounting bracket assembly 100' by friction or, alternatively, by use of a cement adhesive.

In an alternate embodiment, Fig. 7 shows a mounting bracket assembly 100" substantially similar to the mounting bracket assembly 100' shown in Fig. 6. In particular, the U-shaped channel 134' of the attaching section 106" further includes projections 146 for frictionally engaging the first portion 138 of the mounting rail 136.

Numerous alterations and modifications of the structure herein disclosed will present themselves to those skilled in the art. However, it is to be understood that the above described embodiment is for purposes of illustration only and not to be construed as a limitation of the invention. All such modification which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.